BEBR

FACULTY WORKING PAPER NO. 1436

Politicians, Interest Groups, and Regulators: A
Multiple-Principals Agency Theory of Regulation
(or "Let Them Be Bribed")

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by

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February 23, 1988

ABSTRACT: This paper expands the self interest theory of regulation as proposed by Stigler and Peltzman to account for agency problems between politicians and their regulations. The paper shows that the "agency" part of a self-interest theory of regulation provides, by itself, many of the empirical implications traditionally associated with the Stigler-Peltzman approach. The "agency" part, however, has empirically testable implications that differentiate it from the "political" approach. A preliminary test of those implications is performed.

0. Introduction.

The main thrust of the self-interest theory of regulation, as proposed by Stigler (1971) and Peltzman (1976), is that regulations develop as the result of demands from different interest groups for governmental intervention. There is no necessary divergence between politicians' optimal policies (as responses to interest groups demands) and their implementation. Policies, however, are seldom implemented directly by the politicians themselves. Instead, these are delegated to regulatory agencies, departments, or the courts. In this paper I expand the self-interest theory of regulation to account for the potential agency problems between Congress and its regulators, and subject the implications of the agency part of the framework to a preliminary empirical test.

Agency problems between politicians and regulators arise because regulators' actions are intrinsically unobservable. Thus, Congressional (or Presidential) delegation of regulatory authority generates agency discretion. Regulators, then, may pursue interests not aligned with those of the politicians that appoint them.[1] This insight has not gone unobserved to students of the political economy of regulation. Two main approaches have developed. One, coined the "Congressional Dominance" hypothesis, while recognizing the potential agency problems between Congress and its regulators, essentially assumes that Congressional instruments are powerful enough to fully control its regulators.[2] The other approach, embedded in

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[1] Throught this paper I will assume that Congressional interests are well defined. This assumption would hold, if, as is going to be the case here, the policies of the regulatory agency are unidimensional. If policies were multidimensional, then, Congressional interests may not be well defined, and delegation of regulatory authority may in itself provide substantial scope for regulators pursuing their own interests. On this issue see Hammond, Hill and Miller (1985).

[2] While implicit in Stigler (1971) and Peltzman (1976), this assumption appeares explicitly, among others, in Weingast (1984) and Weingast and Moran (1983). See Moe (1985) for a critique of the Congressional Dominance hypothesis.

the naive capture or bureaucratic theories of regulation, implicitly assumes that agency problems are so accute that bureaucracies can work independently of Congressional or Presidential desires.[3] In this paper these two approaches are seen as particular (corner) solutions to a more general agency problem, where politicians and interest groups compete to influence regulators' decisions.[4]

In this paper I focus on Congressional delegation of regulatory authority.[5] While the interests of Congressmen and interest groups are related, they do not necessarily coincide. The electoral connection (e.g. Mayhew (1974)) suggests that Congressmen take into account the electoral consequences of their actions. Congressmen's interests, then, are related to those of a multiplicity of groups. Some may provide support through campaign contributions, while others may provide the necessary electoral support. Unless fully aligned with a particular interest group, Congressmen will not pursue the interests of a single group. Interest groups, then, can influence regulatory outcomes through two channels. Indirectly, through the electoral connection, and directly, trying to influence the regulators. Hence, Congress and interest groups will usually compete for regulators' favors.

While the Congressional Dominance hypothesis deals, naturally, with the role of Congress in the implementation of regulatory policy, this approach can be extended to other political institutions (e.g. the relation between the President and the department secretaries).

[3] See, for example, Niskanen (1971), or Clarkson and Muris (1981).

[4] The unobservability of regulators' actions implies that regulators may shirk for two reasons. First, since regulators may dislike effort, they may shirk so as to reduce their effort. On the other hand, the existence of an interest group not perfectly aligned with politicians' interests implies that interest groups will (implicitly or explicitly) offer compensation to the regulators for shirking. In this paper I assume the existence of such an interest group.

[5] It should be clear from the outset, however, that a more complete analysis should take into account the role of the President in the appointment and control processes. For a discussion of this issue see Calvert, et al (1987), and references therein.

The competition for regulators' favors has several implications for the development of regulatory policies. First, since regulatory policies have non trivial agency costs,[6] Congressmen will balance those costs against the political benefits in assessing whether to undertake a certain regulatory policy. Second, competition between Congress and interest groups implies that even if Congress' interests were exclusively aligned with a single interest group (e.g. their direct constituency), the implementation of regulatory policies would take other interests into account.[7] This feature of the "agency" model presented here is what generates many of the results associated with the "self-interest" approach (e.g. regulators cross-subsidize in a fashion similar to that in Peltzman (1976); they mitigate changes in Congressional demands for regulatory policies,[8] and may make regulatory policies more "pro-industry" in recessions and more "pro-consumers" in booms).[9]

The "agency" framework developed here has however particular implications for optimal regulatory budget policies and for the career path of bureaucrats which differentiates it, empirically, from the political self-interest framework. This

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[6] The agency costs discussed here are different from the costs involved in regulating a firm with private information (e.g. Baron and Myerson (1979)). These costs arise even in the absence of an "agency" problem between Congress and its regulators.

[7] By assuming away the discrepancies in objectives between Congress and regulators, the traditional Congressional dominance approach imposes on regulators an objective function which is characterized by some weighted average of consumer and producer interests (e.g. Peltzman (1976). See also Ross (1985) for a method, and applications, to estimate the regulators' utility function weights.). In contrast, the regulatory framework developed here endogenously determines the regulator's implicit weights.

[8] See Weingast and Moran (1983) for a Congressional dominance model with a similar implication.

[9] Changes in regulatory policy are, here, only partially the result of changes in Congressional desires. They represent, rather, changes in the incentives faced by regulators. Congress, however, knowing those incentives, chooses its optimal policies accordingly.

model predicts that to contraint regulators' actions regulatory budgets must fall following unfavorable outcomes for Congress.[10]   A second set of empirical implications is related to the career path of bureaucrats.   Because of the competition between Congress and industry, it is shown that regulators command rents.   Competition for regulators' jobs, then, implies rent dissipation.   Since Congressmen can be seen as appointing regulators, Congressmen should be able to extract those rents from potential regulators.[11,12] Congressmen may collect the proceeds of the bidding process in the form of campaign or staff work, or in direct monetary contributions.   Limits on campaign contributions, however, implies that "working" for Congressmen may be the most common form of rent dissipation. Most regulators, then, should have some public sector experience.   Similarly, since interest groups should compensate regulators, the "agency" framework predicts that a "high" percentage of regulators should eventually have post-commission jobs related to the regulated industry.

Finally, since agency costs increase when interest groups can influence

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[10] This result formalizes the "fire alarm" approach suggested, among others, by McCubbins and Schwartz (1984).

[11] While in principle, the President appoints Commissioners, Senate oversight committees have to approve the appointments. Thus, Congressmen have substantial power to determine the pool from which potential appointees can be drawn.

[12] In what follows I assume that Congress can be represented as a single agent. This assumption requires some discussion. First, since I analyze regulatory policy as single dimensional, committee majority rule would provide the rationale for this assumption. If, however, regulatory policies were multidimensional, then this assumption would not be sufficient to generate uniqueness of equilibrium. On the other hand, if Congress controls regulators through committees, then this assumption requires either some measure of coordination across congressional committees, or that committees do not represent specialized constituencies. While committee members are able to capture regulators' rents through patronage, Congress as a whole has to agree to finance the agency's budget. Thus, unless committee members are drawn from a random distribution of Congressmen (which they are not), some coordination among committees will be required to assure Congressional approval of the regulators' budgets.

regulators' decisions, Congress could limit the extent by which interest groups can influence regulatory outcomes. I present conditions, however, under which Congress prefers to allow interest groups direct influence on regulatory decisions.[13] While allowing interest groups to influence regulators reduces the extent of regulatory control, interest groups' influence may actually increase Congress' overall benefit from the regulatory process by increasing regulators' rents which are appropiated by Congressmen. In this sense, interest groups' influence on the regulatory process may be seen as indirect contributions to Congressmen.

1. The Model.

Consider a three players game: Congress, the interest group (which for convenience will be called the industry), and the regulator. The model here attempts to capture a situation where Congressmen's interests are aligned with those of a diffuse but electorally important interest group (call them consumers). Because of being a diffuse group, it is not able to directly influence the regulator's actions. Its influence, however, is achieved indirectly through electoral support for Congressmen. Industry, on the other hand, while being a concentrated group may not be able to provide much electoral support.[14,15] Thus,

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[13] Recent public discussion of the "revolving door" at different governmental agencies, has raised the question of whether Congress should further restrict post-governmental employment for senior government executives, which would impose stricter limits on the ability of interest groups to influence the design and implementation of regulatory policies. See GAO (1986).

[14] This model assumes away direct influence of industry on Congressmen. A more general model, would allow industry to make contingent transfers to Congressmen as well, which could take the form of contingent (or retrospective) campaign contributions. If campaign contributions must be designed in a way similar to industry' transfers to the regulators, this extra layer of agency problem may not substantially change the nature of the problem, since there will still be a need for direct industry transfers to regulators.

[15] This paper assumes that industry is able to solve its free-rider problem in making transfers to regulators.

its effect on regulatory outcomes is achieved through directly influencing the regulator's incentives.

Congress' and industry's payoffs are functions of the regulator's actions. The regulator's actions are unobservable, but they affect the distribution of the industry price, p, which has a binary distribution with values $\{p_1, p_h\}$. The probability of observing a low price (p_1) is given by $\phi(x)$, where x is the unobservable action (effort) taken by the regulator.[16] Let $\phi'(x) > 0$. Congress is assumed to prefer a low price, while industry prefers a high price. Given the form of the probability function, Congress' (industry's) preferences are increasing (decreasing) in x. Let Congress' preferences be given by consumer surplus minus the regulator's budget, and industry's preferences by profits net of transfers.[17]

Congress and industry try to influence the regulator's choice of x. Congress' sole instrument is assumed to be the regulator's budget, which can be made contingent on the observed price.[18] Similarly, industry's single instrument is a direct transfer to the regulator which may also be contingent on the observed

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[16] In this model x is unobserved by both Congress and industry. This assumption could be relaxed by letting industry have better information about x than Congress (e.g. industry could observe a signal of x). While this assumption would make the model more realistic, it would increase its complexity without adding substantial new insights.

[17] This paper uses as an example price regulation. The model, however, is more general. The regulator could be thought of as regulating pollution, or safety in the workplace. The main requirement in this model is that Congress' preferences should not coincide with those of the interest group. Notice also, that since budgets enter into Congressmen's preferences, the opportunity cost of a dollar is exactly one. Thus, there is a real utility cost for Congressmen in providing large budgets to their regulatory agencies.

[18] The budget concept that I use here is the discretionary rather than the operational budget. The latter should also impact regulatory efficiency. That is, ϕ could, in principle, depend on the level of operational budget. Here it is assumed that ϕ depends only on the regulator's action x.

price.[19]

For any set of budgets and industry transfers, the regulator chooses the optimal action x, which in turn determines his expected utility. I will assume that the regulator's utility function is increasing in budgets and transfers and decreasing in the action x (effort), and it is further separable in budgets, effort and income (i.e. industry's transfers).

The timing of the game between Congress, industry and the regulator is as follows. First, Congress decides whether to allow industry transfers to the regulator. While in principle, Congress could choose an optimal tax on industry's transfers, for simplicity I assume here that Congress either allows or prohibits transfers.[20] If industry transfers are allowed, then Congress makes public a budget offer to·the regulator, which relates the budget transfer to the realized price. Observing that offer, industry chooses its best transfer offer, which also relates industry transfers to the realized price. Based on those offers the regulator decides on an unobservable action, x. Following the regulator's action a price is observed. Budgets and transfers follow.

Congress' optimal strategies (including its decision to prohibit industry transfers) are derived anticipating the optimal industry offer to the regulator, as

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[19] Industry transfers could take, for example, the form of post-government employment. While I restrict industry's influence instrument to direct transfers, regulated industries may also use other methods to influence regulators.' Owen and Breautigam (1978) analyze how regulated industries use administrative procedures to influence regulatory outcomes. In particular, by threatening to obstruct regulatory proceedings, the regulated industry may be able to provide incentives to the regulator to undertake favorable regulatory actions.

[20] Different regulatory agencies impose different restrictions on senior executives' post-agency employment. For example the Federal Researve Board allows Board members to take industry jobs as long as they completed their full seven years term. Other commissions, however, have less stringent requirements. Below, I discuss the rationale for Congressional choice of different post-agency employment restrictions.

well as the optimal choice of x by the regulator. Similarly, industry's optimal transfer is calculated taking into account the optimal response by the regulator.[21] Congress and industry can then be seen as two principals trying to influence a single agent (the regulator). In this paper principals' strategies are constrained. In particular, budgets and transfers cannot be negative. Also, the equilibrium concept used here requires the principals to choose optimal sequential strategies, with Congress moving first.

Congress' strategies must satisfy the regulator's individual rationality constraint. That is, the regulator's utility must at least exceed his (known) reservation level. Industry's choice, on the other hand, only takes into account the optimal choice of x by the regulator as a function of both Congress' and industry's offers.[22] Since industry benefits from no participation by the regulator, Congress must make sure that its offer provides the regulator enough utility to make his participation worthwhile for all feasible industry offers.[23]

The following assumptions are used throughout:

(A1) $W_B > 0$, $W_x < 0$, $W_{BB} < 0$, $W_{Bx} = 0$, and $W_{xx} < 0$,

(A2) $\phi'(x) > 0$, $\phi''(x) \leq 0$, $\phi(0) = 0$,

(A3) $\Delta U = U_l - U_h > \pi_h - \pi_l = \Delta\Pi > 0$;

where U_j, $j = l, h$, represents Congress' utility from p_j, π_j, $j = l, h$, is the industry profit derived from a price p_j, and $W(B, x) + T$ represents the utility of the

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[21] This model, then, captures parts of the multiple-principals/single-agent framework in Bernheim and Whinston (1986), and the hierarchy framework developed in Tirole (1986). See also Baron (1985) and Ferejohn (1986) on multiple principals.

[22] The equilibrium must also provide the principals with utility and profit levels above their non-participation levels. These constraints are assumed to be satisfied at the equilibrium.

[23] Alternatively, by withdrawing its transfer offer industry could force the regulator to choose not to participate, increasing industry's expected profits.

regulator receiving a budget of B, a transfer of T and performing the action x.[24]

Finally, when performing comparative statics with this model the following

assumptions will be made for computational simplicity:

(A4) $\phi''(x)=0$,

(A5) $W_{xxx}=0$.

2. Statement of The Game.

When Congress allows industry transfers to the regulator, then the solution to

the game played by Congress, industry and regulators is as follows:

The equilibrium is a triple (B,T,x), with $B=(B_l,B_h)$, $T=(T_l,T_h)$, such that

$$x = \underset{\{y\}}{\text{argmax}} \ \{\phi(y)[W(B_l,y)+T_l]+(1-\phi(y))[W(B_h,y)+T_h]\}; \qquad (RP)$$

$$T = \underset{\{T_l,T_h\}}{\text{argmax}} \ \{\phi(x)[\pi_l-T_l]+(1-\phi(x))[\pi_h-T_h]\}, \qquad (IP)$$

subject to:

$$x = \underset{\{y\}}{\text{argmax}} \ \{\phi(y)[W(B_l,y)+T_l]+(1-\phi(y))[W(B_h,y)+T_h]\};$$

and

$$B = \underset{\{B_l,B_h\}}{\text{argmax}} \ \{\phi(x)[U_l-B_l]+(1-\phi(x))[U_h-B_h]\} \qquad (CP)$$

subject to:

x solves (RP),

T solves (IP),

and

$$\phi(x_0)W(B_l,x_0)+(1-\phi(x_0))W(B_h,x_0) \geq w^*, \qquad (IR)$$

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[24] The functions $W(.)$ and $\phi(.)$ are chosen so that the first-order approach to the principal-agent problem used here is valid. See Rogerson (1985) and Grossman and Hart (1983) for a discussion of the problems in using the first-order approach, and the sufficient conditions that make it valid.

$$\text{where } x_0 = \underset{\{y\}}{\text{argmax}} \ \{\phi(y)W(B_1,y)+(1-\phi(y))W(B_h,y)\},$$

and where w^* is the regulator's reservation utility level.

That is, the solution to the game consists of simultaneously solving Congress' (CP), industry's (IP) and the regulator's (RP) problems. The regulator's problem (RP) consists of maximizing its expected utility subject to Congress' and industry's offers. Industry's problem consists of maximizing its expected profits net of transfers, subject to Congress' budget offer and the regulator's first order condition. Finally, Congress' problem involves maximizing expected consumer surplus net of budgets, subject to (a) the regulator's optimal choice of x for any given set of budget and transfer offers, (b) the industry's optimal choice of transfers for any set of budget offers, which in turn depends on the optimal regulator's choice of effort, and (c) the regulator's individual rationality constraint evaluated at a level of zero industry transfers.

Before analyzing the equilibrium, it is useful to determine the first-best benchmark allocation, where industry transfers are not allowed, and where regulator's actions are observable.

2.1. First-Best Regulatory Policy.

When no industry transfers are allowed, and x is observable, Congress' first-best outcome is obtained by solving (CPF) below:

$$\underset{\{B_1,B_h,x\}}{\text{Max}} \ \{\phi(x)[U_1-B_1]+(1-\phi(x))[U_h-B_h]\} \qquad \text{(CPF)}$$

subject to:

$$\phi(x)[W(B_1,x)]+(1-\phi(x))W(B_h,x) \geq w^*.$$

Congress' first-best is given by:

Lemma 1:   In the absence of industry influence in the regulatory process,

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the first-best effort and budget allocations are given by:

(i) $\qquad B_1 = B_h = B$

(ii) $\qquad W(B,x) = w^*$

(iii) $\qquad W_x(B,x)/W_B(B,x) = -\phi'(x)(U_1 - U_h).$

The proof of the Lemma is straightforward, and is not presented. The intuition is the following. Since the single principal (Congress) is risk neutral while the agent is risk averse on budgets, all risks are allocated to the principal by providing the regulator with a constant budget. Furthermore, the regulator is driven to his reservation level, and Congress' welfare is maximized subject to those constraints. Consequently, the rates of substitution between effort and budget for both Congress and the regulator are equalized.

3. Equilibrium Outcomes.

3.1. No Industry Transfers.[25]

If Congress is able to restrict industry from offering transfers to regulators, the game becomes one between Congress and the regulator.[26] It is, then, a simple principal-agent problem. The equilibrium is then a pair (B,x), $B = (B_1, B_h)$, such that

$$x = \underset{\{x\}}{\mathrm{argmax}} \ \{\phi(x)W(B_1,x) + (1-\phi(x))W(B_h,x)\} \qquad \text{(RRP)}$$

$$B = \underset{\{B_1, B_h\}}{\mathrm{argmax}} \ \{\phi(x)[U_1 - B_1] + (1-\phi(x))[U_h - B_h]\} \qquad \text{(RCP)}$$

subject to:

$$x = \underset{\{y\}}{\mathrm{argmax}} \ \{\phi(y)W(B_1,y) + (1-\phi(y))W(B_h,y)\} \qquad \text{(RFOC)}$$

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[25] In what follows I will refer to the "unrestricted" ("restricted") game as that where industry is (not) allowed to make transfers to the regulator.

[26] This would be the case if, for example, Congress could impose a life-time ban on private employment following governmental work, and strictly control post-agency earnings.

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and

$$\phi(x)W(B_1,x)+(1-\phi(x))W(B_h,x)\geq w^*; \qquad\qquad\qquad (RIR)$$

where (RFOC) and (RIR) represent the constraints involving the regulator's optimal

choice of effort and his participation decision respectively.

In the usual way, the model is solved backwards by first analyzing the

regulator's problem given in (RRP). The first order condition for the regulator,

for any (B_1,B_h), is given by

$$\phi'(x)[W(B_1,x)-W(B_h,x)] + W_x(B_h,x) + \xi^{Rx}=0, \qquad x\xi^{Rx}=0. \qquad (1)$$

From (1) we observe, first, that to obtain an internal solution the first term

in (1) has to be positive. Thus,

Corollary 1: In the absence of industry transfers, $x>0$ if and only if $B_1>B_h$.

That is, the regulator should, in equilibrium, prefer a low to a high price

outcome. Equation (1) establishes a correspondance between x and the actual values

of Congress' budgets. The internal solution to (1) is of the form

$$x = x(B_1,B_h), \qquad\qquad\qquad (2)$$

with $x_{B1}>0$ and $x_{Bh}<0$.[27]

The solution to (RCP) and (RRP) (the "restricted game"), is characterized in

Lemma 2.

Lemma 2: The solution to (RCP) and (RRP) is given by

  (i) $B_1 > B_h \geq 0$;

  (ii) If $\delta \leq 1/W_B^h$, then $B_h=0$;

  (iii) For $B_h>0$, $W_B^1/W_B^h = - \phi(1-\delta W_B^1)/[(1-\phi)(1-\delta W_B^h)]$;

  (iv) $\phi=0 \Rightarrow B_1=0$;

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[27] Assumptions (A1)-(A3) guarantee the signs of the partial derivatives of $x(.)$, with $x_{B1}=-\phi'W_B^1/[\phi''(W_1-W_h)+W_{xx}]$, $x_{Bh} = \phi'W_B^h/[\phi''(W_1-W_h)+W_{xx}]$, and $W_j=W(B_j,x)$.

where δ is the lagrange multiplier associated with the regulator's individual rationality constraint, and W_B^j represents the derivative of $W(B,x)$ with respect to B evaluated at B_j. The proof of Lemma 2 is similar to that of Lemma 3 and is not given here.

Observe that Congress could, in principle, achieve the first-best regulatory effort level. Expected budgets, however, would exceed the first-best levels. This result is stated in Proposition 1.

Proposition 1: In the absence of industry transfers,

(i)   the first-best level of effort is achievable if and only if

$$\phi(x^*)(U_1-U_h)W_B(B^*,x^*) \leq w^*-W(0,x^*). \tag{3}$$

(ii)   Furthermore, if (3) holds, then

$$B^* < \phi(x^*)B_1(x^*)+(1-\phi(x^*))B_h(x^*),$$

where (B^*,x^*) represent the first-best combination of budget and regulatory effort, and $B_j(x^*)$, j=1,h, represent the budget allocations needed to implement x^* in the restricted game.

The proof of Proposition 1 involves finding a pair (B_1,B_h) so that x^* can be implemented as an equilibrium to the restricted game. Since, in principle B_1 can be adjusted so that the regulator receives no rents, condition (3) requires that the highest feasible punishment that Congress can impose upon the regulator (a zero budget) should provide the regulator with a substantial relative disutility, compared to his reservation utility level, that will motivate him to undertake the optimal effort. Furthermore, since the regulator's expected utility equals w^*, assumption (A1) implies (ii).

3.2. Equilibrium with Industry Transfers.

When Congress is unable (or prefers not) to restrict industry's transfers to the regulator, competition between Congress and industry develops. The difference

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between the outcome to this game and the one where Congress prohibits industry transfers, arises because $\pi_l < \pi_h$ while $U_l > U_h$. That is, the regulatory objectives of the two principals are contradictory. Thus, with positive industry transfers, the regulator enjoys a utility level above his reservation level. The individual rationality constraint in (CP), in Section 2, is then calculated at the level of effort that the regulator would undertake if faced with $T=0$, and $B=(B_h, B_l)$.[28]

We can then state,

Corollary 2:   If the equilibrium involves positive transfers by industry, then the regulator's expected utility exceeds his reservation level.[29]

Let us first analyze the regulator's problem in the unrestricted game, given in (RP) in section 2. The first order condition for the regulator, for any (B,T), is given now by

$$\phi'(x)[W(B_l,x)+T_l-W(B_h,x)-T_h] + W_x(B_h,x) + \xi^x=0, \qquad x\xi^x=0. \qquad (4)$$

Observe that to obtain an internal equilibrium, the regulator must also prefer a low price outcome to a high price one. That is,

Corollary 1.1.: $x>0$, if and only if

$$W(B_l,x)+T_l>W(B_h,x)+T_h.$$

The equilibrium to this game (the "unrestricted game") is characterized below.

Lemma 3: The interior solution to (CP), (RP) and (IP), is given by:

   (i) $T_l=0$, $T_h \geq 0$,

   (ii) $B_l>B_h \geq 0$,

   (iii)   if $\delta=0$, then $B_h=0$,

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[28] This level of effort (x_0) is the equilibrium one only when the optimal industry transfer is in fact $T=0$.

[29] This result does not imply that the individual rationality constraint in Congress' problem is never binding at the equilibrium, since this constraint is calculated at zero industry transfers. On this see more below.

(iv) $\phi=0$ implies $B_1=0$,

   $1-\phi=0$ implies $T_h=0$,

(v) $EW=\phi(x)[W_1-W_h-T_h]+(1-\phi(x))[W_h+T_h]\geq w^*$,

   with the inequality in (v) being strict when $T_h>0$;

where $0\leq\delta\leq1/W_B^h$ represents the lagrange multiplier associated with the

individual rationality constraint in Congress' problem.

The proof of Lemma 3 is given in the Appendix. The intuition behind Lemma 3 is
that both industry and Congress will try to influence the regulator to take
favorable actions. In the case of industry such an action is to undertake a low
regulatory effort. This can be achieved by making the compensation to the
regulator very large when there is a favorable outcome, (i.e. a high price), while
punishing him for unfavorable outcomes. Since we restrict transfers to be
nonnegative, the worst punishment is a transfer of zero. Thus, both Congress and
industry make low transfers in (their respective) unfavorable outcomes.

Lemmas 2 and 3 show that budget restrictions follow unfavorable outcomes, and
in the unrestricted game, are accompanied by industry transfers. Thus,

Corollary 3:   Budget restrictions follow unfavorable outcomes for Congress,

   and are accompanied by industry transfers.

Lemmas 2 and 3 also show that the budget and effort allocations in the
restricted and the unrestricted games are not the same.[30] It can also be seen that
for every budget offer the optimal x in the restricted game exceeds that of the
unrestricted game. The intuition is clear. In the unrestricted game, industry is
able to compensate the regulator for high price outcomes. Thus, given any offer B,

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[30] Substituting (B*,x*) (the solution to the unrestricted game) into (1) we
observe that the value for the left hand side of (1) is positive. Thus, (B*,x*) is
not a solution to the restricted game.

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the regulator will tend to provide less regulatory effort.[31] Furthermore,
Proposition 2 shows that competition between Congress and industry generates social
overexpenditure on regulation related activities.

Proposition 2:   In the presence of direct industry transfers, the total monetary
                  expenditure on regulation exceeds the minimum required to achieve
                  the equilibrium regulatory outcome.

    The proof is given in the Appendix.[32] Proposition 2 implies that if industry
was allowed to make direct transfers to Congress but not to the regulators, then
both industry and Congress could be made better off. Thus,

Corollary 4:   If industry is not allowed to pay Congressmen directly, social
                  overexpenditure in regulation is an equilibrium outcome.

    Observe that Corollary 4 does not say that regulatory agency budgets are
necessarily larger than optimal. Rather, total social expenditure on regulation is
above what it would be necessary if Congress and industry would coordinate their
actions.[33] Whether actual budgets increase when industry transfers are allowed
cannot be answered in general terms.[34]

3.3. Comparative Statics in the Presence of Industry Transfers.

    While there are feasible corner solutions to the unrestricted game (i.e.

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[31] The expected budget, however, may be higher in the unrestricted game.

[32] See Bernhaim and Whinston (1986) for a general proof of this proposition.
In the Appendix I present a direct proof of the Proposition.

[33] See Niskanen (1971) for a different overexpenditure result.

[34] The presumption is that since allowing industry transfers exacerbates the
"agency" problem, Congress will try to control the regulator by offering him a
riskier lottery (that is, Congress may want to increase the difference between B_l
and B_h). This result, while plausible, is not always correct. In section 4 I
present an example in which when the regulator's individual rationality constraint
is not binding the equilibrium budget for the restricted and unrestricted case is
the same.

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T=B=x=0, or B$\geq$0, x>0, T=0), here I concentrate on the internal solution to the game. The parameters of the model are w^*, π_1, π_h, U_1 and U_h, while the endogenous variables are B_1, B_h, T_1, T_h, and x. When the individual rationality constraint is not binding, i.e. $\delta=0$, the interior solutions are functions of the profit difference, $\Delta\Pi=\pi_h-\pi_1$, and of the consumer surplus difference, $\Delta U=U_1-U_h$. By fully differentiating the first order conditions to (CP), (IP) and (RP), and holding constant (p_1,p_h), the following comparative statics are derived:

Lemma 4: If in the solution to (CP), (IP), and (RP) $\delta=0$, then,

$$\frac{dB_1}{d\Delta\Pi} = \frac{1}{[2W_B^1-(\Delta U-B_1)W_{BB}^1]} > 0, \qquad \frac{dB_1}{d\Delta U} = \frac{W_B^1}{[2W_B^1-(\Delta U-B_1)W_{BB}^1]} > 0,$$

$$\frac{dT_h}{d\Delta\Pi} = 1/2 + \frac{W_B^1}{2[2W_B^1-(\Delta U-B_1)W_{BB}^1]} > 0, \qquad \frac{dT_h}{d\Delta U} = \frac{(W_B^1)^2}{2[2W_B^1-(\Delta U-B_1)W_{BB}^1]} > 0,$$

$$\frac{dx}{d\Delta\Pi} = \frac{\phi'(x)[W_B^1-(\Delta U-B_1)W_{BB}^1]}{2W_{xx}[2W_B^1-(\Delta U-B_1)W_{BB}^1]} < 0; \qquad \frac{dx}{d\Delta U} = \frac{-\phi'(x)(W_B^1)^2}{2W_{xx}[2W_B^1-(\Delta U-B_1)W_{BB}^1]} > 0.$$

The proof of Lemma 4, while tedious, is straightforward and is not presented here. It involves taking the full derivatives of the first order conditions of the unrestricted game.

Lemma 4 has several empirical implications which are similar to those originally developed in Peltzman (1976).[35] Here, however, these results do not arise from the workings of Peltzman's "political wealth effect," but rather from competition between the two principals in an "agency" framework. First, observe

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[35] When $\delta>0$, the comparative statics become much more complicated. Still it can be shown that the following holds:

$$\frac{dB_1}{d\Delta U} > 0, \quad \frac{dB_h}{d\Delta U} < 0, \quad \frac{dT_h}{d\Delta U} > 0, \quad \frac{dx}{d\Delta U} > 0,$$

$$\frac{dB_1}{d\Delta\Pi} > 0, \quad \frac{dB_h}{d\Delta\Pi} < 0, \quad \frac{dT_h}{d\Delta\Pi} > 0, \quad \frac{dx}{d\Delta\Pi} < 0.$$

that if the marginal utility of a dollar of budget (in the low price state) is less than the marginal utility of a dollar of transfer (i.e. $W_B^1<1$), then budgets, transfers and regulatory effort are more sensitive to changes in profit differentials ($\Delta\Pi$) than to changes in consumer surplus differentials (ΔU). The rationale for this result is that if in equilibrium $W_B^1<1$, Congress compensates regulators with a relatively inefficient instrument, and a marginal increase in budgets increases regulatory effort by less than a marginal increase in transfers (i.e. $|dx/dB_1| = -\phi'(x)W_B^1/W_{xx} < -\phi'(x)/W_{xx}=|dx/dT_h|$). That would not be the case if Congress could make direct monetary transfers to its regulators. Thus, we can state:

Proposition 3:   If in the solution to (CP), (IP), and (RP), $W_B^1<1$ and $\delta=0$, then, changes in budgets, transfers and regulatory effort are more sensitive to changes in profit differentials than to changes in consumer surplus differentials.

Second, observe that holding constant $\{p_1,p_h\}$, an increase in marginal cost would increase the profit differential. Thus, from Proposition 3 we obtain that the workings of the "regulatory lag" should be stronger when demand changes (i.e. changes in ΔU) than when cost changes (i.e. changes in $\Delta\Pi$). Observe, also, that an increase in marginal cost reduces the extent of regulatory effort. Thus,

Corollary 5:   The regulatory system dampens the effect of demand on prices, but magnifies the effect of costs on prices.

Third, if during booms ΔU increases while $\Delta\Pi$ falls, while the opposite holds during recessions,[36] then Lemma 4 predicts that regulatory effort will increase during booms and fall during recessions. The rationale for this result is that

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[36] This will be the case if during booms productivity increases while demand functions rotate outwards becoming more elastic.

during booms the willingness to pay by Congress for regulatory effort increases while it falls for industry. The opposite will hold during recessions. Thus,

Corollary 6:   If ΔU ($\Delta \Pi$) is procyclical (anticyclical), then regulations are oriented towards "consumer protection" during booms and towards "producer protection" during recessions.

Finally, from Lemma 4 we obtain that the regulation of industries with low costs will be more weighted toward "consumer protection" than that of high cost industries. Thus, if what drives differences among regulated industries are costs differences, then positive profits and "industry capture" will be negatively correlated. Another implication similar to those in Peltzman (1976) relates to Congress' incentives to regulate industries. In particular, Congress' largest benefits from regulation arise from large demand-low cost industries. The rationale is that the lower the industry cost, the lower the industry's profit differential, and the smaller the agency costs of regulation. Conditioned on Congress not being able to extract the rents from the regulators, we can state:

Lemma 5:   If Congress cannot extract the regulator's rents, and if in the solution to (CP), (IP), and (RP) $\delta=0$, then

$$\frac{dEU}{d\Delta\Pi} = \frac{[\phi'(x)]^2[W_B^l-(\Delta U-B_1)W_{BB}^l]}{2W_{xx}[2W_B^l-(\Delta U-B_1)W_{BB}^l]} - \frac{\phi(x)}{[2W_B^l-(\Delta U-B_1)W_{BB}^l]} < 0,$$

$$\frac{dEU}{d\Delta U} = \phi(x),$$

where $EU = \phi(x)(U_1-B_1) + (1-\phi(x))(U_h-B_h)$.

This result, however, may not follow if Congress is able to extract regulator's rents. In particular, Lemma 6 states that if the individual rationality constraint is not binding, then regulators' rents increase with both ΔU and $\Delta \Pi$.

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Lemma 6: If in the solution to (CP), (IP) and (RP) $\delta=0$, then

$$\frac{dEW}{d\Delta\Pi} = (1-\phi(x))/2 + (1+\phi(x)) \frac{W_B^1}{[2W_B^1-(\Delta U-B_1)W_{BB}^1]} > 0,$$

$$\frac{dEW}{d\Delta U} = \frac{(W_B^1)^2}{2[2W_B^1-(\Delta U-B_1)W_{BB}^1]}(1+\phi(x)) > 0,$$

where $EW = \phi(x)(W(B_1,x)-W(B_h,x)+T_1-T_h)+W(B_h,x)+T_h-T_1$.

The proofs of Lemmas 5 and 6 while tedious are straightforward and are not presented here.

Lemmas 5 and 6 introduce the possibility that by extracting regulators' rents, Congress' benefits from regulation increase with the opposition of industry to the regulation (i.e. the larger the industry's profit differential). In this case, then, Congress incentives to restrict industry transfers may fall. These issues are analyzed next.

3.4. **Bidding for Regulatory Positions.**

As discussed above, if industry transfers are positive, regulators receive rents.[37] A bidding process, then, should develop by which potential regulators transfer all their excess rents to Congress. The transfer, however, is independent of the actual actions the regulator takes once in the job. Thus, the bidding process by itself has no effects on the actual equilibrium, nor on the regulator's individual rationality constraint.[38]

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[37] This result holds even when the individual rationality constraint is binding.

[38] Would-be regulators are supposed to bid for their rights to become regulators. If regulatory appointments were allocated to the highest bidder, then the regulator that can capture the largest rent would obtain the position. Thus, the would-be regulator with the lowest w* will obtain the position. If regulators' utility were also a function of the regulatory outcome, then regulatory rents would also depend on the characteristics of the utility function of the regulator. Congress would then allocate regulatory positions on the basis of regulator's utility functions (on a model trying to explore this insight see McCubbins, et al.

Combining Lemmas 5 and 6 we obtain:

Corollary 7: If potential regulators bid all their expected excess rents, then if in the solution to (CP), (IP), and (RP), $\delta=0$, we obtain

$$\frac{dEU^B}{d\Delta\Pi} = \frac{W_B^1(1+\phi(x))-2\phi}{2[2W_B^1-(\Delta U-B_1)W_{BB}^1]} + \frac{(1-\phi)}{2} + \frac{(\phi')^2[W_B^1-(\Delta U-B_1)W_{BB}^1]}{2W_{xx}[2W_B^1-(\Delta U-B_1)W_{BB}^1]} \gtrless 0,$$

$$\frac{dEU^B}{d\Delta U} = \phi + (1+\phi)\frac{(W_B^1)^2}{2[2W_B^1-(\Delta U-B_1)W_{BB}^1]} > 0.$$

where $EU^B = EU + EW - w*$.

It is then feasible that a larger profit differential ($\Delta\Pi$) may actually increase Congress' expected benefit from the regulation since if Congress extracts regulators' rents, it will capture part of the increase in the total (political) surplus originating from an increase in the profit differential (i.e. from an increase in the demand for *no-regulation*). Hence, Congress may find optimal not to restrict industry transfers. The following section analyzes conditions under which Congress may allow industry to make transfers to regulators.

4. Optimal Choice of Restrictions on Industry Transfers.

The ability of industry to make transfers to regulators has two counterbalancing effects on Congressional benefits from regulation. On the one hand, industry transfers exacerbate the "agency" problem between Congress and the regulator. On the other hand, regulator's rents are larger when industry transfers are allowed. Congress will then balance increased appropiation of regulator's rents against a lower level of direct regulatory benefit. Thus, if the direct cost of lower regulatory effort is too large (i.e. a large ΔU) then Congress should prefer to restrict industry transfers.

If the individual rationality constraint is binding in the restricted game,

(1987)).

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however, in the absence of industry transfers there are no rents that Congress can appropiate from the regulators. Thus, the gains from allowing industry transfers may substantially exceed those that can be obtained when the individual rationality constraint is not binding in the restricted game. Thus, we should expect less restrictions on industry transfers for regulators whose reservation utility levels are relatively high.

Proposition 4, below, shows that if Congress cannot capture the regulators' rents, then in the absence of enforcement costs Congress will choose to prohibit industry from making transfer offers.

Proposition 4:   Under assumptions (A1)-(A5), in the absence of regulatory bidding, the solution to (CP), (IP), and (RP) implies $EU^R > EU^U$, where EU^R (EU^U) represents Congress' expected utility when industry transfers are (not) prohibited.

The proof of the proposition is given in the Appendix. The intuition for this proposition is clear. Industry transfers increase the cost of regulations, reducing Congress' expected gains from regulation. This proposition has implications for understanding the process of regulatory appointments and interest group influence. If Congress could not extract rents from the regulators, it would prefer to deter interest groups from directly influencing the regulatory process. Restricting interest groups, however, may be costly. In that case, partial restrictions may be optimal. Partial restrictions may be implemented in two different ways. First, all regulators may be deterred equally from employment in agency-related businesses. Alternatively, different regulatory agencies may stipulate different restrictions. The current model provides a direct rationale for discretional choice of post-agency employment restrictions. If the cost of

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enforcing those restrictions are independent of their benefits,[39] then agencies where the difference between EU^R and EU^U is not too large should have more permissive post-agency employment restrictions. In the example given in Section 4.1 below, the larger ΔU the larger the difference between EU^R and EU^U.[40] Also, for the same example, Table 1 shows that the larger w^* the lower the difference between EU^R and EU^U. Observe, also, that regulatory effort increases with ΔU but falls with w^*. Thus, the industries for which it is optimal to relax post-agency employment restrictions are also those where regulatory effort (in the absence of industry transfers) would not have been "too" large. Allowing transfers would further reduce the extent of regulatory effort. Thus, on average, the regulatory process should be more "pro-industry" in cases for which Congress allows direct industry influence. The existence of regulatory bidding, which is dealt with next, provides a further rationale for relaxing influence restrictions.

4.1. Regulatory Bidding and Optimal Restrictions: An Example.

The purpose of this example is to present, for a specific probability and regulatory utility functions, conditions under which Congress will allow industry transfers when regulators' jobs are obtained through bidding.

The regulator's utility and probability functions are specified as follows:

(A6) $W(B,x) = \sqrt{B} - x^2$,

(A7) $\phi(x) = x$, $0 \leq x \leq 1$.

Also, I normalize the problem by assuming

(A8) $\Delta \Pi = \pi_h - \pi_l = 2$.

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[39] Enforcement costs relate to those costs incurred so as to deter industry from making payments to regulators. These costs may involve the costs of examining former regulators income tax returns, enforcing restrictions on post-agency employment, etc.

[40] This can be seen from Table 1 for the case of $w^* > \Delta U/12$, and from comparing Lemmas 2.a and 3.a, below, for the case when $w^* < \Delta U/12$.

Below I analyze the solution to the games when Congress does and does not allow industry transfers. First, Lemmas 2.a and 3.a present the equilibria under both regimes. Substituting assumptions (A6)-(A8) into the first order conditions for the restricted and unrestricted games, we obtain the following results.[41]

Lemma 2.a: Under assumptions (A1)-(A8), in the absence of direct industry

transfers, the equilibrium is characterized by:

$x = (\sqrt{B_l} - \sqrt{B_h})/2$, $\delta > (=) 0$ if $w^* > (<) \Delta U/12$;

and, if $\delta = 0$, then

$B_l = \Delta U/3$, $B_h = 0$, $EU^R = (\Delta U/3)\sqrt{(\Delta U/3)} + U_h$, $EW^R = \Delta U/12$;[42]

where $EU^R = \phi(U_l - B_l) + (1-\phi)(U_h - B_h)$, and $EW^R = \phi W(B_l, x) + (1-\phi) W(B_h, x)$.

Lemma 3.a: Under assumptions (A1)-(A8), in the presence of direct industry

transfers, the equilibrium is characterized by:

$x = (\sqrt{B_l} - \sqrt{B_h} - T_h)/2$, $T_h = (\sqrt{B_l} - \sqrt{B_h})/2$, $T_l = 0$, $\delta^c > (<) 0$ if $w^* > (<) \Delta U/12$;

and if $\delta^c = 0$, then

$B_l = \Delta U/3$, $B_h = 0$, $EW^U = \Delta U/48 + \sqrt{(\Delta U/12)} > \Delta U/12 > w^*$,

$EU^U = (\Delta U/6)\sqrt{(\Delta U/3)} + U_h$;[43]

where EU^U (EW^U) represents Congress' (the regulator) expected utility in

the unrestricted case.

The proofs of Lemmas 2.a and 3.a are derived from Lemmas 2 and 3, and are not

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[41] See Appendix A for the first order conditions of the "unrestricted" game. The first order conditions for the restricted game can be similarly derived.

[42] If $\delta > 0$, then B_h and B_l are implicitly determined by $\Delta U - 12(w^* - \sqrt{B_h}) + 8(w^* - \sqrt{B_h})\sqrt{(w^* - \sqrt{B_h})} - 4\sqrt{B_h}\sqrt{(w^* - \sqrt{B_h})} = 0$, and, $\sqrt{B_l} = \sqrt{B_h} + 2\sqrt{(w^* - \sqrt{B_h})}$.

[43] If $\delta^c > 0$ then $\sqrt{B_h}$ and $\sqrt{B_l}$ are implicitly given by $\sqrt{B_l} = \sqrt{B_h} + 2\sqrt{(w^* - \sqrt{B_h})}$, and $\Delta U - 12(w^* - \sqrt{B_h}) + 8(w^* - \sqrt{B_h})\sqrt{(w^* - \sqrt{B_h})} = 0$.

presented.[44]

In the remainder of this section I analyze Congressional choice of restrictions, assuming that restrictions are chosen to capture regulators' rents. A bidding process, by which regulators bid up to their expected rents (i.e., EW-w*) constitutes such a process.[45] The following Proposition presents the result of the institutional comparison in the presence of regulatory bidding.

Proposition 5: Under assumptions (A1)-(A8), if regulators' jobs are obtained through bidding, then if $\delta=0$ (i.e. w*<ΔU/12), then for ΔU<2.0663 EU^{BU}>EU^{R}.

When the individual rationality constraint is not binding, direct comparison of EU^{BU} and EU^{R} from Lemmas 2.a and 3.a can be performed, showing the proposition. The result presented in Proposition 5 can be augmented by analyzing the simulation results presented in Table 1, columns 3 and 5. There we see that when the individual rationality constraint is binding (i.e., w*>ΔU/12), then for each ΔU, there exists a W*(ΔU) such that for w*>W*(ΔU) EU^{BU}>EU^{R}.[46]

These results provide the strongest argument for allowing direct industry transfers to regulators. By increasing regulator's rents, direct industry transfers increase the amount potential regulators are willing to bid for their positions,

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[44] It is also straightforward but tedious to see that the following comparative statics hold:

$dT_h/dw^* \geq 0$, $dB_l/dw^* \geq 0$, $dB_h/dw^* \leq 0$, $dEB/dw^* \geq 0$, $dx/dw^* \geq 0$,

$dT_h/d\Delta U > 0$, $dB_l/d\Delta U > 0$, $dB_h/d\Delta U < 0$, $dEB/d\Delta U > 0$, $dx/d\Delta U > 0$,

where EB represents the expected Congressional budgetary allocation.

[45] If Congress captures the regulators' rents, then Congress' expected utility will be given by EU^B = EU+EW-w* = $\phi(x)[U_l-B_l]+(1-\phi(x))[U_h-B_h]$ + $\phi(x)[W_l+T_l]$ + $(1-\phi(x))[W_h-T_h]$ - w*.

[46] Observe that if there are enforcement costs, then the inequalities in Proposition 5 should be further relaxed.

increasing Congressmen's rents from the political process. Thus,

Corollary 10:   If regulators bid for their jobs, it would be optimal for Congress
                  to allow industry transfers if regulators' reservation utility
                  level is relatively high, or the costs from a lower regulatory
                  effort level (ΔU) are relatively low.

5. A Test of the Model.

The model presented in this paper can be tested by analyzing the determinants
of the career path of bureaucrats. The main implications of the agency model
developed above are: first, Congress and industry will reward regulators for
favorable outcomes by increasing their transfers. Second, regulators' rents are
dissipated through bidding for regulatory positions. Appointments, then, take the
form of patronage. Real politics, however, are not as simple as the model in this
paper. In particular, politicians have other instruments to reward regulators for
favorable outcomes. Regulators may be appointed to more prestigious positions in
the public sector (e.g. cabinet positions), or rewarded with access to Congressmen,
increasing their general productivity. Since commissioners leave their agencies
almost every year, Congress will use all its instruments to reward and punish its
regulators. If there was a favorable outcome the commission's budget will be
increased, and those regulators that quit the agency would be provided with other
non-budgetary compensations.

Similarly, industry does not have to provide the regulator with a job to
compensate him for favorable outcomes. For example, the regulator may go to work
for a law firm, with industry channelling some of its legal work through it.

Thus, the strongest empirical implication of the model is, that, conditioned on
a regulator quitting the commission, the probability of going to work (directly or
indirectly) for the industry falls with the agency's budget during the regulator's

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last period at the agency.[47,48]

Eckert (1981) shows the typical career path for regulatory commissioners to consist of coming to the agency with substantial previous public sector experience, and in an important proportion leaving the commission to work (directly or indirectly) for the industry they previously regulated. As Eckert suggests this stylized fact cannot reject the specific-capital hypothesis, namely, that during their tenure at the commissions, regulators acquire substancial industry-specific capital, making an industry-related position more attractive. The specific-capital hypothesis, however, does not share the main empirical implication of the agency framework. In particular, if the regulator's ability is unknown to the private sector, an augmented signaling-cum-specific-capital hypothesis would predict a positive, rather than negative, correlation between budgets and the probability of regulated industry jobs. A larger budget would imply that the regulator is an able and productive manager. Since he also has acquired industry specific-capital, larger budgets should be positively correlated wity industry jobs.[49]

A second empirical implication of the model consists of the use of patronage. Clearly not all regulatory appointments are patronage appointments. Many (and perhaps some of the most important) regulators have had no public service

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[47] It is clear that the decision to quit at a given period depends (among other things) on the available offers the regulator has received. Therefore, the optimal quitting time and post-agency employment will be related. While a general model that estimates simultaneously the optimal length of stay at the agency and the optimal career choice could be developed, it is beyond the scope of this work.

[48] The type of budget concept that I use is described in the data section.

[49] A positive correlation between industry jobs and budgets is further strengthened from a strategic consideration. Since industry prefers to be regulated by inneffective regulators it may find it optimal to hire those commissioners that turn out to be efficient regulators. Thus, if a larger budget is a proxy for the regulator's unobserved ability, the probability of an industry job increases with the budget.

experience at all. The rationale for their appointment may not be to capture their potential economic rents. For example, since politicians would benefit from appointing regulators whose preferences are biased towards their own interests, it is conceivable that public sector experience is a way for politicians to learn potential regulators preferences. In that case, regulators will not be very receptive to industry offers. Thus, the probability of obtaining industry related jobs should be smaller for non-patronage appointments.

A third empirical implication is derived from the passing, in 1978, of a broad government ethics bill (S. 555), imposing new restrictions on senior government employees' post-government employment. Under the new bill former employees could never lobby the government on matters they worked on directly, and the bill also required a cooling off period of one or two years in which former government employees would be restricted from contacting their former agencies.[50] Following the passage of the ethics bill, then, industry's cost of transfers would increase. Thus, the correlation between the probability of an industry job and budgets should be weakened following the introduction of the Ethics bill. Furthermore, the overall probability of an industry job should fall following the Ethics bill.[51]

A test of the model consists then of estimating the determinants of the conditional probability of a regulator working for the industry following his tenure at the commission. While the empirical specification used here does not provide an estimate of the structural parameters of the model, the model will not

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[50] The bill was first introduced in 1977, and drew substantial support in both the House and the Senate. The Senate passed an omnibus government ethics bill already in June 1977, but the House's proliferation of Ethics bills implied that the final passage of the bill had to be postponed to 1978.

[51] Actually, since in early 1977 it was already clear that the bill will pass (see Congressional Quarterly Weekly Report, Dec. 3 1977, p. 2523), the effect of the Ethics bill should start being felt in 1977 itself.

be supported by the data if the probability of going to work for industry does not fall with the agency's discretionary budget during the last period of the regulator's tenure.

The empirical model to be used is a Probit model, $\text{Prob}(\text{PostInd}_i=1) = F(X_i\beta)$, i=1,N, where PostInd is a dummy variable taking a value of one if the regulator's job after the commission is directly or indirectly related to the regulated industry; F(.) is the normal CDF, β is the vector of parameters to estimate, and X is a vector of exogenous variables given by **X** = (Patronage, Age, DBudget, Ethics, DBudget*Ethics, Other Dummies), where Patronage takes a value of one if the regulator had public sector experience preceding his commission appointment, Age is the age of the regulator when leaving the commission, DBudget is a measure of the discretionary budget during the regulator's last year at the commission, Ethics is a dummy taking a value of one if the regulator left the commission in 1977 or later. The other dummies are described in the next section.

6. The Data.

The data set is composed of the career path of regulators for the ICC, CAB and FCC, and a of measure of discretionary budgets.

a. Career Path of Regulators.

Most of the data on the career path of bureaucrats used here were provided most generously by Professor Ross Eckert of Claremont College. For each regulator Professor Eckert collected the period of his or her tenure at the commission, as well as his/her pre- and post-agency experience. Professor Eckert's data set consists of all regulators that were appointed until 1978. Following a methodology similar to Professor Eckert's, I collected information for those commissioners that were appointed after 1978 and that completed their work at the commissions by 1984. I also checked and up-dated the information in Professor Eckert's data set.

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Thus, for each regulator I have information on age, tenure at the Commission, and pre- and post-agency experience. I created a Post-Industry dummy equal to one if the post-agency employment of the regulator is directly or indirectly related to the regulated industry. A direct relationship means being an employee of a regulated firm. An indirect relationshiop means to work for a law firm that does industry work. Similarly, I created a Patronage dummy equal to one if the regulator's pre-agency employment was at the public sector, and a Pre-Industry which equals one if the pre-agency employment of the regulator was directly or indirectly related to the regulated industry.

The main requirement for a regulator to be in the sample is to have a complete career path. Since I do not use the information on regulators that are incumbent as of 1985 or that died in office, not all regulators in Eckert's sample are in mine. Also, I do not include in the sample regulators for whom I was not able to find a specific post- or pre- agency activity (whether retired or still at work).

Because of the need to have a consistent time series of discretionary budgets, my data set includes only those regulators that left the ICC after 1932, the CAB after 1943, and that left the FCC after 1939.[52]

The data sources are multiple and are similar to those described in Eckert (1981). Multiple issues of the following Who's Who were used: Who's Who in America, Who's Who in American Politics, Who's Who in Finance and Industry, Who's Who in Government. Newspapers sources were The New York Times, the Wall Street Journal, and the New York Times obituaries. The source on law firm's affiliation

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[52] The reason for selecting this sample is that the estimation of the budget equation uses lagged values of budgetary appropiations. Consequently, I include CAB and FCC regulators that left their commission not earlier than three years following the first congressional budgetary appropiation for their commission. To be able to have a comparable institutional framework for the three agencies, I included only ICC commissioners that left the ICC after 1932.

and nature of legal practice was the Martindale-Hubbell Law Directory (different issues). Professor Eckert also provided me with press releases of the different commissions listing the backgrounds of their current commissioners. The information offices of the different agencies also provided information about some of their previous commissioners' post-agency employment.

b. Discretionary Budgets.

For each agency I collected the annual Congressional appropiation. From this figure I am interested in capturing the portion that is "discretionary." I define "discretionary" as unexplained by business cycle conditions, by trends, or by general movements in the federal civilian budget. Thus, for each agency I estimate a basic budget equation of the following form:

$$Budget_{ti} = a_{0i} + a_{1i}NonDefense_t + a_{2i}Unemployment_t + a_{3i}Budget_{it-1} +$$

$$a_{4i}Budget_{it-2} + a_{5i}Budget_{it-3} + a_{6i}Trend + a_{7i}Trend^2 + e_{it}, \quad i=CAB,FCC,ICC;$$

where "NonDefense" represents total federal non-defense expenditures, and "Budget" the agency appropiation for the year. Both NonDefense and Budget are deflated by the CPI, and are expressed in natural logarithms.

To obtain from the basic budget equation a measure of the discretionary budget during the last year of the regulator's tenure at the commission, I estimate the budget equation for that commission with the sample period excluding the year in consideration. The discretionary budget for that year for a specific agency is then defined as the (out of sample) prediction residual. To make the three time series of discretionary budgets comparable across agencies, I normalize them by dividing each constructed agency's time series by its standard deviation.[53]

7. The Empirical Results.

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[53] See Table 5 for the means and standard deviation of each agency's time series of discretionary budgets.

Table 2 presents the distribution of regulators by agency and occupation, and Table 3 presents the occupation matrix. Of the 129 regulators three quarters come to the agency with public sector experience, and almost half leave to work directly or indirectly for the regulated industry. While 49% of patronage appointments go to work for industry following their tenure at the commission, only a third of the regulators that come from the private sector do so.[54] There are no major differences accross agencies, except that, in this sample, only one CAB commissioner came from the regulated industry.

Table 4 presents the Budget equations for the three agencies. All budgets are correlated with general non-defense expenditures, and are sensitive to general business cycle conditions. However, while CAB's and ICC's budgets increase with unemployment, FCC's budgets falls. There does not seem to be remaining serial correlation of the residuals.[55] Table 5 shows the distribution of the logarithm of discretionary budgets for the regulators in my sample. There is substantial variation in the logarithm of discretionary budgets, and their means are not statistically different from zero.

Table 6 presents the main empirical results. The main hypotheses being tested are whether larger discretionary budgets and the Ethics Bill of 1978 reduce the probability of obtaining a regulated-industry job. Different specifications are presented,[56] trying to capture the effects of various exogenous variables.

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[54] Thus, as expected, this sample does not differ much from Eckert's (1981).

[55] Since there are lagged-dependent variables in the right hand side, Durbin's h test and the t-statistic for first-order serial correlation are reported.

[56] I tested whether the Probit equation can be pooled across the different agencies. To perform the test I estimated a Probit equation where all parameters are allowed to vary across agencies, and tested whether the restriction that all parameters are the same across agencies can be rejected. The test is given by -2(log(LU)-log(LR)) where log(LR) (log(LU)) is the logarithm of the (un)restricted

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General business conditions are proxied by the Unemployment variable; the Patronage and PreIndustry dummies capture the regulatory selection process; the Republican dummy captures any possible effects across different administrations; the Post-1965 dummy captures the effect of the increase in regulations that followed the mid-1960s; the Ethics Dummy captures the effect of the Ethics Bill of 1978; the Female dummy captures any potential sex differences in career paths, while the DBudget*Ethics variable captures the change in the cost of industry transfers following the Ethics Bill.

Column 1 shows the results of estimating the Probit equation where the set of explanatory variables does not include any of the budget variables. Patronge appointments have a higher probability of obtaining a regulated industry job; as do younger regulators; republican administrations seem to reduce the probability of regulators working for the regulated industry; female commissioners go to work for the regulated industry in much lower proportions than their male colleagues,[57] and the Ethics bill seems to have reduced the probability of working for industry.

Column 2 presents the estimation of the Probit equation when all the variables are included, and Columns 3 and 4 perform robustness tests by excluding selected variables.[58] Here, increases in discretionary budgets seem to reduce the

estimation, and it is distributed as $\chi^2(q)$, with q being the number of restrictions. For the specification chosen the statistic was equal to 9.322, which is smaller than the critical value for all normal confidence values. The specification on which this test was performed did not include the unemployment, female or the republican variables.

[57] There are, though, only 7 female commissioners in my sample.

[58] Since columns 2 to 4 present qualitatively similar results, I will proceed the discussion based on the results of column 2. From column 4, however, we see that the results concerning the Ethics Bill and the Republican coefficients (but not that of the coefficient of DBudget*Ethics) are sensitive to whether the Post-1965 variable are included or not. Thus, inferences about the independent role of the Ethics Bill and of the Party should be made with caution.

probability of going to work for the regulated industry. The effect of discretionary budgets seems to differ following the Ethics Bill of 1978. While the change is insignificant, it is positive, implying that the effect of discretionary budgets may have fallen following the passage of the Ethics Bill. Macroeconomic considerations seem to affect the decision to go to work for the regulated industry. Finally, the probability that regulators leaving their commissions obtain regulated industry jobs seems to be smaller during republican administrations. This result may suggest that either Republican administrations enforce the conflict of interest laws more stringently, or that they are able to lure regulators with better alternative compensations, reducing industry's ability to make transfers to regulators.[59]

These results, then, suggest that discretionary budgets and post-agency employment at the regulated industry are negatively correlated, with the correlation being reduced following the passage of the Ethics Bill.

Congress, then, seems to have used budgets to discipline its regulators.

8. Final Comments.

In this paper I present a multiple-principals/single-agent model of regulation. The model provides a framework to analyze Congress' incentives to regulate industries as well as to restrict the ability of interest groups to impact upon the outcomes of the regulatory process, and empirically testable implications different from the traditional self-interest hypothesis. The empirical evidence provided here does not reject the existence of an agency problem between Congress and its regulatory agencies. While Congress seems to use its budgets to discipline regulators, Congressional control does not seem to be perfect.

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[59] See, however, column 4 where this result does not hold if the Post-1965 varible is excluded.

TABLE 1

SIMULATION RESULTS

ΔU	$w*$	EU^{BU}	EU^{U}	EB^{U}	EU^{R}	EB^{R}
2.2	.2	.610	.313	.179	.626	.358
	.4	.524	.204	.383	.429	.625
	.6	.324	.004	.583	.149	.762
	.8	.044	-.276	.863	-.191	.999
	1.0	-.316	-.636	1.223	-.600	1.327
2.6	.4	.648	.318	.464	.638	.852
	.6	.448	.118	.664	.328	.924
	.8	.168	-.162	.944	-.033	1.136
	1.0	-.192	-.522	1.304	-.458	1.448
3.0	.4	.775	.443	.506	.885	1.012
	.6	.578	.245	.765	.536	1.144
	.8	.298	-.035	1.045	.148	1.304
	1.0	-.062	-.395	1.405	-.295	1.591
3.6	.4	.965	.632	.506	1.265	1.012
	.6	.789	.465	.929	.916	1.516
	.8	.505	.186	1.262	.469	1.655
	1.0	.145	-.174	1.623	-.012	1.864
	1.2	-.295	-.614	2.062	-.547	2.212
4.0	.4	1.092	.759	.506	1.518	1.012
	.6	.944	.620	.929	1.239	1.859
	.8	.652	.358	1.431	.724	2.069
	1.0	.250	.000	1.999	.206	2.103
	1.2	-.190	-.440	2.439	-.352	2.404

Note: $EU^{BU} = \phi(U_1-B_1) + (1-\phi)(U_h-B_h) + EW-w*$

$EU^{U}, EU^{R} = \phi(U_1-B_1) + (1-\phi)(U_h-B_h)$,

where values are given by Lemmas 2.a and 3.a for the restricted and the unrestricted case respectively.

< T1>

TABLE 2

PRE- AND POST-AGENCY EMPLOYMENT OF REGULATORY COMMISSIONERS

	ICC	CAB	FCC	TOTAL
PRE-AGENCY EMPLOYMENT				
REGULATED INDUSTRY	9	1	10	20
PUBLIC SECTOR	32	28	36	96
OTHER PRIVATE SECTOR	5	6	2	13
POST-AGENCY EMPLOYMENT				
REGULATED INDUSTRY	21	15	22	58
PUBLIC SECTOR	7	7	8	22
OTHER PRIVATE SECTOR	18	13	18	49
TOTAL	46	35	48	129

Source: See text.

< T 2 >

TABLE 3

EMPLOYMENT TRANSITION MATRIX

PRE-AGENCY EMPLOYMENT

POST-AGENCY EMPLOYMENT	PUBLIC SECTOR	REGULATED INDUSTRY	OTHER PRIVATE SECTOR
PUBLIC SECTOR	18 (.19)	2 (.10)	2 (.15)
REGULATED INDUSTRY	47 (.49)	7 (.35)	4 (.31)
OTHER PRIVATE SECTOR	31 (.32)	11 (.55)	7 (.54)
TOTAL	96	20	13

Note: Percentages are given in parentheses.
Source: See text.

< T 3 >

TABLE 4

BUDGET EQUATIONS

DEPENDENT VARIABLE: REAL BUDGETARY APPROPIATION IN LOGARITHMS

	ICC	CAB	FCC
CONSTANT	-1.41 (-1.18)	-.33 (-.44)	1.17 (1.21)
REAL NONDEFENSE EXPENDITURES	.17 (2.21)	.22 (3.18)	.41 (3.05)
BUDGET(-1)	1.13 (9.36)	.88 (5.74)	.64 (4.74)
BUDGET(-2)	-.35 (-1.93)	-.03 (-.17)	-.14 (-1.06)
BUDGET(-3)	-.06 (-.41)	-.23 (-1.51)	-.28 (-3.50)
TREND	.04 (2.52)	.04 (3.03)	.6E-3 (.08)
TREND2	-.3E-3 (-2.63)	-.9E-3 (-4.13)	.12E-3 (.79)
UNEMPLOYMENT	.01 (2.42)	.02 (1.71)	-.02 (-3.30)
R-SQUARED	.91	.98	.97
D-W	2.006	1.958	1.905
DURBIN-h	-.045	1.167	.949
t-statistic for AR(1)	-.446	.174	.443
NUMBER OF OBS.	53	42	48

Note: Ordinary least squares estimation.

< T 4 >

TABLE 5

DISTRIBUTION OF DISCRETIONARY BUDGETS

	ICC	CAB	FCC
MEAN	-.01961	.00146	-.00796
STANDARD DEVIATION	.09769	.08656	.10118

Source: Table 4.

< T 5 >

TABLE 6

PROBIT EQUATION

DEPENDENT VARIABLE: REGULATORS' POST-COMMISSION REGULATED INDUSTRY EMPLOYMENT (N=129)

CONSTANT	5.59	6.42	6.22	6.82
	(2.24)	(2.52)	(2.46)	(2.70)
PATRONAGE	.50	.59	.65	.55
	(1.15)	(1.35)	(1.48)	(1.27)
PRE-INDUSTRY	.02	.17	.22	.19
	(.04)	(.33)	(.42)	(.37)
LOG AGE	-1.49	-1.71	-1.71	-1.78
	(-2.37)	(-2.65)	(-2.67)	(2.77)
DISCRETIONARY	--	-.26	-.18	-.27
BUDGET	--	(-1.75)	(-1.44)	(-1.83)
DBUDGET*ETHICS	--	.21	--	.31
	--	(.62)	--	(.92)
ETHICS BILL	-.54	-.47	-.52	-.05
	(-1.43)	(-1.21)	(-1.36)	(-.15)
POST-1965	.62	.61	.64	--
	(1.99)	(1.90)	(2.03)	--
REPUBLICAN	-.37	-.33	-.36	-.11
	(-1.40)	(-1.15)	(-1.37)	(-.44)
UNEMPLOYMENT	-.01	-.03	--	-.03
	(-.34)	(-.90)	--	(-.92)
FEMALE	-1.18	-1.16	-1.13	-1.14
	(-1.76)	(-1.67)	(-1.66)	(-1.66)
LOG LIKELIHOOD	-80.02	-78.41	-79.01	-80.27
PERCENTAGE CORRECT	.620	.628	.604	.643

Note: Asymptotic t-statistics in parentheses.

< T 6 >

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< R 2 >

APPENDIX

A. Proof of Lemma 3:

Industry first order conditions are given by (A.1):

(A.1a) $\quad x_{T1}\phi'[\pi_1-T_1-\pi_h+T_h] - \phi + \xi_{T1} = 0,$ $\qquad\qquad\qquad \xi_{T1}T_1=0,$

(A.1b) $\quad x_{Th}\phi'[\pi_1-T_1-\pi_h+T_h] - (1-\phi) + \xi_{Th} = 0,$ $\qquad\qquad \xi_{Th}T_h=0,$

where $x_{T1}=-\phi'/W_{xx}$, and $x_{Th}=\phi'/W_{xx}$ are derived from the regulator's first order conditions. Equations (A.1) imply $T_1=0$, since for an internal solution $\Delta\Pi>T_h-T_1$. That $B_1>B_h>0$ can be derived from the first order conditions for Congress which are given in (A.2).

(A.2a) $\quad -\phi'^2[\Delta U-B_1+B_h]W_B^1/(2W_{xx}) - \phi[1-\delta\phi^0/\phi W_B^1] + \xi_{B1} = 0,$ $\qquad \xi_{B1}B_1=0,$

(A.2b) $\quad \phi'^2[\Delta U-B_1+B_h]W_B^h/(2W_{xx}) - (1-\phi)[1-\delta W_B^h(1-\phi^0)/(1-\phi)] + \xi_{Bh} = 0,$ $\qquad \xi_{Bh}B_h=0.$

Rearrenging (A.2a) and (A.2b) we obtain $W_B^1\leq W_B^h$, implying $B_1\geq B_h$. Observe that as long as $T_h>0$, $B_1>B_h$, since $\phi^0>\phi$ for $T_h>0$. The derivation of (iii) is straightforward from (A.2b). To see that $\phi=0 \Rightarrow B_1=0$, assume an equilibrium with $x=\phi=0$ but $B_1>0$. Then, by reducing B_1, Congress will experience no reduction in x and a welfare increase because of a budget reduction. (v) is derived directly from Corollary 2.

B. Proof of Proposition 2:

Assume that x^0 is the equilibrium regulatory effort. (B_h^0,B_1^0) and T_h^0 are spent to achieve that outcome. We want to show that the expected total amount, $\phi(B_1^0+T_1^0)+(1-\phi)(B_h^0+T_h^0)$, exceeds the minimum required to obtain x^0, where the probability function is evaluated at x^0. The first order conditions to minimize total expected expenditures subject to the individual rationality constraint and $x(B_1,T_1,B_h,T_h)=x^0$ are given by

(B.1) $\qquad \phi-\gamma x_{B1}-\delta\phi W_B^1 - \xi_{B1}^M = 0,$ $\qquad\qquad\qquad\qquad \xi_{B1}^M B_1 = 0,$

(B.2) $\qquad \phi-\gamma x_{T1}-\delta\phi - \xi_{T1}^M = 0,$ $\qquad\qquad\qquad\qquad\qquad \xi_{T1}^M T_1 = 0,$

< A 1 >

(B.3) $(1-\phi)-\gamma x_{Bh}-\delta(1-\phi)W_B^h \;-\; \xi^M{}_{Bh}=0,$ $\xi^M{}_{Bh}B_h = 0,$

(B.4) $(1-\phi)-\gamma x_{Th}-\delta(1-\phi) \;-\; \xi^M{}_{Th} = 0,$ $\xi^M{}_{Th}T_h = 0;$

where δ (γ) is the lagrange multiplier associated with the individual rationality (constant effort level) constraint. Observe first that $W_B^l=1$ is a solution to this problem. Since $x_{Th}<0$ and $1/W_B^h \leq \delta \leq 1/W_B^l=1$, we obtain that $T_h=0$. From (B.2) we obtain that $\delta=1+\gamma\phi'/(\phi W_{xx})$, which after some substitutions implies $W_B^l=1<W_B^h=(1-\phi)/(1-\phi+\gamma\phi'/(\phi W_{xx}))$. Thus, to achieve x^0 at minimum cost, compensations should make the regulator's rate of substitution between money and budget equal to one in low price states, but larger than one in high price states. Since this allocation differs from the equilibrium one, the latter is not a cost minimizing solution.

B. Proof of Proposition 4:

Let $S^R=\{x,B_h,B_l \mid \phi(x)[U_l-B_l]+(1-\phi(x))[U_h-B_h]\geq EU^R*\}$, where EU^R* represents the equilibrium expected utility level for Congress in the restricted game. S^R represents the set of points in (x,B_h,B_l) that provide Congress with a level of expected utility that equals at least that achieved in the restricted game. Call $X^R=\{x,B_h,B_l \mid x=x(B_h,B_l,T_h=0)\}$ where the function $x(.)$ is derived from the first order condition for the regulator. From assumptions (A1)-(A5) and the definition of equilibrium to the restricted game, $X^R \cap S^R$ consists of the restricted equilibrium values for (x,B_h,B_l), and is unique. Let $X^U=\{x,B_h,B_l \mid x=x(B_h,B_l,T_h=T_h^U*)\}$, where T_h^U* is the equilibrium industry transfer in the unrestricted game. Since from the first order condition for the regulator we know that $x(B_h,B_l,T_h=T_h^U*) < x(B_h,B_l,T_h=0)$, then $X^U \cap S^R$ is empty. Thus, the unrestricted equilibrium cannot provide Congress with a utility level in excess of EU^R*.

< A 2 >

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